Asthma in Children—Problems in Diagnosis

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SUMMARY

Bronchial asthma in children may be difficult to diagnose. Education of the parents regarding allergic conditions, specifically bronchial asthma, is exceedingly important in order to assure satisfactory treatment and clinical results.

Chest symptoms of unexplained origin in early life should immediately arouse suspicion of allergic disease. Other causes of asthmatic symptoms must be borne in mind and excluded before a positive diagnosis of bronchial asthma is established.

Of the many factors to be considered in investigating a child with asthma, a comprehensive history is most essential. The climate to which the patient is exposed and the psychic influences must be taken into account. Physical examination, x-ray films and laboratory procedures should be carefully executed. Skin testing, especially with food allergens, should not be relied upon to give all the information in allergic disease. Some form of diet trial, such as elimination diets, should be used if sensitivity to food is suspected.

A HISTORY of allergic disease during childhood is found in 50 per cent of adults who have bronchial asthma. During childhood, bronchial asthma is the most frequent of the various manifestations of allergic sensitivity. Thus it is evident that the problems involved in diagnosing asthma in children are of primary importance.[13]

The onset of asthma in small children does not always follow the pattern typically seen in older individuals and for this reason it is undoubtedly overlooked in many cases. A definite diagnosis may be in doubt for a considerable length of time and through several attacks. It must be established by eliminating the various other conditions that may cause wheezing and dyspnea. Once the diagnosis has been made, many physicians tend to minimize the condition to the parents in the hope that the disease will not recur and that as the patient grows older he will cease to have asthma. It has been proved that the earlier an allergic state is recognized the easier it is to control and, if properly treated, the less liable it is to be a problem in later life.

The treatment of asthma in children is a somewhat different problem than that encountered in adults. In the first few years of life, the symptoms and physical findings are completely objective. It is the family rather than the patient who must be convinced of the need for therapy. Often there have been signs of other allergic manifestations, such as eczema or nasal allergic disease, which have conditioned and prepared the family for the diagnosis of bronchial asthma. The physician who makes the original diagnosis must satisfy the family that the illness is actually an allergic problem and that bronchial asthma is not just a cold, bronchitis or croup.

Several attacks, possibly of increasing severity, may have to occur before the family is convinced. After the diagnosis has been established the question of cause arises, and the all-important problem of educating the parents regarding allergic diseases begins. They should be told that asthma tends to recur and particularly that it is rarely cured but can be controlled. It is essential that they recognize that the disease will demand prolonged observation and therapy and that specific treatment of bronchial asthma in childhood is of definite value. If the treatment of all children with asthma were considered a perennial problem, the results of therapy would be greatly enhanced. In this respect, the experience of most allergists is in agreement with the conclusions drawn by Flensborg[4] in Denmark. According to Flensborg's study, children not receiving specific therapy were more prone to repeated attacks of bronchial asthma and other allergic manifestations than those who were specifically treated.

The tendency to wait to see if the child will outgrow the allergic state is born of wishful thinking and is not based on sound clinical observation. In one series,[2] asthma developed in 50 per cent of eczematous children. This observation spotlights the fallacy of the common saying, "Don't worry, Mother, the baby will outgrow his eczema."

Asthma becomes a significant problem in children before the age of five years. The average age of onset is between two and four years. It occurs more frequently in boys than in girls. The classical sequence is colic, starting most commonly about the age of three weeks; atopic dermatitis (infantile dermatitis) starting a few weeks later; recurrent upper respiratory infections, starting between the ages of two and three years, followed by the development of pollenosis or perennial allergic rhinitis and finally bronchial asthma.[6] Chest symptoms of unexplained origin in early life should immediately arouse suspicion of allergic disease.[7] During this period allergic edema rather than smooth muscle spasm is dominant; the spastic element does not develop char-

acteristically until the child grows older. At times noisy breathing and loud rales are the only signs of the condition. Bronchial asthma may not be indicated by physical findings present at the time of examination. The diagnosis must be made by means of history, skin testing and laboratory studies.

SYMPTOMS

The symptoms of bronchial asthma in children differ from those in adults as follows: (a) Asthma in children may only cause dyspnea or rapid breathing; (b) the asthmatic infant may appear comfortable, even when lying flat on his back. The absence of orthopnea can cast doubt on the diagnosis of asthma; (c) the absence of anxiety in the infant is particularly noticeable when compared to the feeling of apprehension common in the adult.

TYPES OF ASTHMA

Bronchial asthma in children is of two types, paroxysmal and chronic. The symptoms of both types are varied degrees of wheezing, dyspnea and coughing. The clinical course in the paroxysmal group largely depends on the efficiency and success of treatment. Chronic asthma, the condition which is most wearing for the patient and his family, is extremely difficult to control and treat satisfactorily.

The most common complications of long continued bronchial asthma in the child are emphysema and a typical chest deformity.[1] Because of its resemblance to that caused by rickets, this deformity is termed asthmatic pseudorickets. Bronchiectasis[17] also may prove a complicating factor.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of bronchial asthma is important. The many other causes of wheezing, dyspnea and coughing which must be kept in mind are as follows:

1. *Asthmatic bronchitis* in children is characterized by coryza, fever and poor response to ephedrine and epinephrine. There is a predominance of eosinophils in nasal smears and an accelerated blood sedimentation rate. It may be followed by bronchial asthma. Fever may be present with bronchial asthma alone, but may also arise from secondary infection or from allergic reaction, especially to foods.

2. *Foreign bodies in the bronchus* sometimes may cause wheezing, coughing, or shortness of breath. X-ray, fluoroscopic and bronchoscopic examinations are mandatory when an obstruction is suspected.

3. *Pulmonary conditions arising from cystic fibrosis of the pancreas* do not respond to ephedrine or epinephrine. Poor absorption of vitamin A as indicated by vitamin A tolerance tests, diminution or absence of the pancreatic enzymes on duodenal drainage, and the finding of a high fat content in the stools make the differential diagnosis.

4. *Thymic asthma* is rare. Enlargement of the thymus gland is immediately evident in x-ray films of the chest, and the condition responds rapidly to roentgen therapy.

5. *Dust bronchitis,* which has been noted in the dust-bowl area of the Middle West, is due to inhalation of finely pulverized dust. The resultant coughing is explosive and intractable. Fever and wheezing may be associated with soft, patchy mottling of the lungs in x-ray films.

6. *Sighing dyspnea* due to hyperventilation is a functional disorder which may occur in older children. Physical examination shows no abnormalities. The chief complaint is the difficulty of getting a deep breath. The condition is not helped with epinephrine.

7. The possibility of mistaking *pertussis* for bronchial asthma must be remembered. Pertussis is characterized by a lack of response to ephedrine or epinephrine, an absence of eosinophils in the blood, by leukocytosis with relative lymphocytosis, and by growth of *H. pertussis* on culture.

8. *Bronchotetany* is rare but may cause dyspnea and wheezing. Intravenous injections of calcium relieve the symptoms.

9. *Cardiac asthma* rarely occurs in infancy or childhood. (White's[18] youngest patient was 18 years of age.)

10. *Lymphadenopathy and mediastinal tumors, including Hodgkin's disease,* may result in compression and constriction of some part of the respiratory tract, causing wheezing and coughing.

11. *Allergic bronchopneumonia or Loeffler's syndrome* may cause transitory infiltrations of the lungs which can be revealed by x-ray examinations of the chest. A very high blood eosinophilia usually accompanies this condition. Miller and Piness[12] reported a series of cases of such allergic bronchopneumonia.

12. Frequently, mild (sometimes even severe) bronchial asthma in childhood is confused with pseudo-bronchopneumonia, infectious bronchitis or croup. On the other hand, actual pneumonia must be recognized and may be superimposed upon allergic bronchitis or bronchial asthma.

INVESTIGATION

There are many factors that must be considered in making a diagnosis of bronchial asthma in a child. A physician has the responsibility of reviewing the condition of the patient not only from a laboratory standpoint but as a whole. To accomplish this, the following factors should be taken into account:

History: It is hardly necessary to stress the great importance of obtaining a detailed history — one which includes data on psychological and environmental influences and the various other allergic manifestations as well as the family background. A detailed dietary history is of the utmost significance. This record should reveal dislikes or disagreements for specific foods and any possible imbalance of diet. A careful study of environmental and occupational surroundings also is essential when inhalants are suspected. Several conferences with the

parents may be necessary, as many details are not remembered on the first visit.

Effect of climate: Temperature, humidity, altitude and seasons have varying effects on bronchial asthma, especially when rapid climate changes occur. Schutzbank[16] recently found that 72 per cent of a series of patients with allergic disorders were benefited by living in Tucson, Arizona. The beneficial effects of inland, dry areas on allergic disease caused by foods, as well as decrease or abatement of the condition in the summer, as reported by Rowe,[14] has been confirmed in the author's experience. The explanation of these geographic influences is obscure. The benefit of summer weather probably depends on the sun's radiation.

Psychosomatic factors: The psychic aspects of asthma in children are difficult to evaluate. A majority of the behavior problems of the asthmatic child can be explained on a physical basis,[5] although this is not invariably true. Therefore, treatment of the psychic problem may be as significant as the program of hyposensitization or any other therapy. For example, some children, in order to gain attention, will dominate the home or schoolroom by actually precipitating or simulating acute cough, wheezing or asthmatic attack. Whether these children have an actual attack of asthma is difficult to establish. Control of the psychic influences may make the difference between good and poor control of an asthmatic child. For this reason, the exact influence of psychic problems must be evaluated for each patient and an endeavor made to rectify any contributory condition. Every attempt should be made to allow the child to lead as normal a life as possible and to make him feel that he is secure. This should be particularly reflected in the parents' attitude. Henderson[8] wisely suggested that "healthy neglect may even be preferable to over-solicitude."

Physical examination: Physical examination must be such as to uncover not only bronchial asthma but other manifestations of allergic reaction. The child should be carefully scrutinized for evidence of focal infections and other diseases. An x-ray examination of the chest, and, in older children, of the sinuses, should be routine. It must be remembered, however, that between attacks of asthma, there may be no abnormality observed in examination of the lungs.

Laboratory procedures such as examination of nasal smears and differential count of blood cells may be of some help in establishing the diagnosis.

Skin testing: The knowledge gained from skin testing is secondary in importance to that obtained from a detailed history. In the author's opinion, however, information can be gained from skin testing that could not possibly be elicited in any other way. Opinions differ regarding the number of tests which should be done. In recent "Letters of the International Correspondence Society of Allergy,"[11] the question was asked, "How many and what type of skin tests do you consider essential in a case of bronchial asthma?" The opinions ranged from doing nearly no tests at all to the extreme of making several hundred tests. The method of skin testing also varied.

There is also a question as to the value of skin tests in very young children. Skin reactions are much less likely to be evident in the first two years of life. Some physicians believe that skin testing is of no value in the first year of life. The author believes it often gives some clue to skin test infants in the first two years of life for reaction to the foods they have in their limited diets and for reaction to inhalants they may encounter. The method used is to screen the patient with scratch tests for response to the allergens felt to be important for the child. If the patient does not respond to the scratch tests, intradermal tests are rarely used for patients less than six years of age, and then for only the very important inhalant allergens. The information gleaned from tests with foods is by no means as reliable as that with inhalants. Moreover, there are children who are definitely sensitive to inhalants, and especially to foods, who do not have reaction to skin tests. The number of allergens with which a child is tested should increase as his age increases. Passive transfer tests may at times be indicated. Ophthalmic and nasal membrane tests have little value in determining the cause of allergic disease in children. The size of the reaction to skin testing has no bearing on the importance that the allergen causing the reaction may play in the child's condition.

FOODS

The problem of allergic sensitivity to foods in children is of paramount importance. The fact that foods can cause asthma in children cannot be disputed.[10] There is considerable difference of opinion as to the frequency of this sensitivity and its relative importance to recurrent respiratory infections, sensitization to pollens and other environmental allergens. Certainly, during the first few years of life, food sensitivities play a major role as a cause of allergic bronchial disease. A history of colic, vomiting and diarrhea, or of many changes in the food formula in early life, suggests the possibility of food sensitivity. Because of the limited number of foods in the diet in infancy, the study of possible allergenic foods is not difficult. Soya milk and the strained meat formulae offer complete substitutes for cow's milk. Potato and tapioca can be used in place of cereal. Many vegetables and fruits can be utilized. Thus, with processed foods, food substitutes and synthetic vitamins, nutrition and weight can be amply protected. Our experience confirms the reported frequency of allergic reaction to milk, eggs and the cereals, along with other less commonly offending foods such as fish, chocolate, citrus fruits, bananas and apples.

Here again, there is a difference of opinion. Hill[9] feels that asthma is rarely caused by allergic sensitivity to food. Cook[3] expressed the opinion that no more than 20 per cent of the cases of asthma in children are due to food. The author's experience leads to the belief that sensitivity to food plays the

chief role in bronchial asthma during the first five or six years of life.

Hill[10] recently discussed the danger inherent in test-negative diets. A five-year-old girl was brought to him with a typewritten list of "good" foods typed in black, and "bad" foods typed in red. The classification had been determined by skin tests. Tests had been done with 236 foods, including squab, tripe, calf brain, venison, caviar, poppyseed, elderberry, pheasant, chives and Limburger cheese. The child had had reaction to 109 of them, including Sanka coffee, rutabaga, German celery, thyme, cranberry, sand-dabs, tripe, sweetbreads and watercress. Among the foods she was allowed to eat were pheasant, guinea-hen, venison, horsemeat, turtle, abalone, caraway seed, juniper, avocado, mango and quince. This shows how far afield test-negative diets can go.

To determine the exact influence of any one food upon an asthmatic state is not easy, because of the many complicating and contributing factors involved. There is a great variance of tolerance to food at various times of life. The mother of a child with allergic disease may know some of the foods that produce asthma and often may have omitted them from the child's diet before skin tests were done.

Diet trial has a definite place in evaluating allergic response to foods. Because of the inadequacy of skin testing, some kind of diet trial must be used. Elimination diets such as those outlined by Rowe[15] are of definite help, particularly if they are modified as indicated by the history and skin testing of the patient. Such diets eliminate the most common offending foods and establish a definite program with detailed menus and recipes. If the mother is instructed carefully and the diet is followed in detail, nutrition and weight are well protected.

INHALANTS

In infancy and early childhood inhalants play a less important role than do food allergens. Inhalants become more important as age increases. Most of the children who react to pollen also react to house dust.

BACTERIAL ALLERGY

True bronchial asthma due to sensitivity to bacteria is rare in children. However, infections of any type may activate or increase allergic manifestations. Therefore, eradication and control of infections is required for the benefit on the allergic state and also for the child's general health.

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